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CALIFORNIA PARTICULATE MATTER MONITORING NETWORK DESCRIPTION

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1.0 INTRODUCTION

The California Air Resources Board (ARB) in partnership with the local air quality management districts within California have developed a PM2.5 monitoring network to implement the new PM2.5 National Ambient Air Quality Standards (NAAQS). The term *PM2.5* applies to airborne particles with aerodynamic diameters less than 2.5 microns. The PM2.5 network is designed to enable the air quality management community in California to collect ambient PM2.5 data as required by Title 40 of the Code of Federal Regulations (40 CFR), Parts 50, 53, and 58, published in the Federal Register on July 18, 1997. The ambient data from this network will be used for designating areas as attainment or non-attainment of the PM2.5 air quality health standards, developing control programs, and tracking the progress of these control programs.

During the early stages of the PM2.5 network design process, the ARB and the local air quality management districts established Monitoring Planning Areas (MPAs) for the State. There are 18 MPAs that have been used for locating PM2.5 monitoring sites throughout California. They were determined to be the best geographical divisions for PM2.5 monitoring network planning. They are not intended for designating areas as attainment or non-attainment or for determining specific PM2.5 control measures. The U.S. Environmental Protection Agency (U.S. EPA) has not yet established the boundaries to be used for these purposes.

This document, the *California Particulate Matter Monitoring Network Description*, consists of a statewide summary and separate appendices, one for each MPA. The appendix for an MPA includes a detailed description of the proposed network along with the specific monitoring site locations and sampling frequencies. The objective of this document is to summarize the particulate matter monitoring strategy for California.

1.1 Population Characteristics of California

California is one of the largest and most diverse state of the nation. With more than 32 million people, California is home to 12.2 percent of the U.S. population, more than any other state. The population of California has grown enormously in the years following the Second World War. In 1946, 9.6 million people lived in California. The population in 1997 was 32.6 million, an increase of 240%. The California Department of Finance projects that by the year 2040, 63 million people will be living in California.

1.2 Monitoring Planning Areas

The ARB and the local air quality management districts established 18 MPAs as the administrative framework for planning a PM2.5 monitoring network. With few exceptions, the boundaries of MPAs correspond to the boundaries of the various air basins in the State. California is divided geographically into air basins for the purpose of managing the air quality resources on a regional basis. Areas within each air basin are considered to share the same air masses and are therefore expected to have similar ambient air quality. The State is currently

divided into 15 air basins.

The State is also divided into Air Pollution Control Districts and Air Quality Management Districts (together they are referred to in this document as the *districts*), which are county or regional governing authorities that have primary responsibility for controlling air pollution from stationary sources. In the South Central Coast Air Basin and the Salton Sea Air Basin, the MPAs correspond to the local district boundaries of the agencies having jurisdiction over these areas. Also, the South Central Coast Air Basin has been divided into three MPAs, one for each of the districts in the air basin. The splitting of these air basins facilitates the development of the PM2.5 network plans within these MPAs. Table 1.2.1 lists the air basins, districts, and MPAs in California.

The development of this *California Particulate Matter Monitoring Network Description* was a cooperative effort among the air quality management agencies in California. The ARB was responsible for assembling the statewide network plan. The following eight districts drafted PM plans for their MPA: Bay Area AQMD, Great Basin Unified APCD, Monterey Bay Unified APCD, San Diego County APCD, San Luis Obispo APCD, San Joaquin Valley Unified APCD, South Coast AQMD, and Ventura County APCD. The ARB drafted an additional nine MPA plans for the remainder of the State with the assistance and cooperation of the local districts in these areas. One of the roles of the ARB has been to ensure the coordination of the plan for each district along with the plans developed in adjoining districts.

The ARB and the local air quality districts have not established Community Monitoring Zones. The consensus among the air quality agencies is that it would be premature at to do so at this time. *Community Monitoring Zones* within an MPA are intended for spatial averaging of PM2.5 data for comparison with the PM2.5 standards. The decision in California is to defer consideration of Community Monitoring Zones (CMZs) until there are adequate monitoring data from the PM2.5 monitors included in this network plan.

Table 1.2.1
California Air Basins, Air Quality Districts, and PM2.5 Monitoring Planning Areas

Air Basin	Air Quality District	PM2.5 Monitoring Planning Area
Great Basin Valleys	Great Basin Unified APCD	Great Basin Valleys
Lake County	Lake County AQMD	Lake County
Lake Tahoe	Placer County APCD El Dorado County APCD	Lake Tahoe
Mojave Desert	Antelope Valley APCD Kern County APCD Mojave Desert AQMD	Mojave Desert
Mountain Counties	Amador County APCD Calaveras County APCD El Dorado County APCD Mariposa County APCD Northern Sierra AQMD Placer County APCD Tuolumne County APCD	Mountain Counties
North Central Coast	Monterey Bay Unified APCD	Monterey Bay
North Coast	North Coast Unified AQMD Northern Sonoma County APCD Mendocino County AQMD	North Coast
Northeast Plateau	Siskiyou County APCD Modoc County APCD Lassen County APCD	Northeast Plateau
Sacramento Valley	Butte County AQMD Colusa County APCD Feather River AQMD Glenn County APCD Placer County APCD Sacramento Metropolitan AQMD Shasta County AQMD Tehama County APCD Yolo/Solano AQMD	Sacramento Valley
Salton Sea	South Coast AQMD	Coachella Valley
	Imperial County APCD	Imperial County
San Diego Air Basin	San Diego County APCD	San Diego County
San Francisco Bay Area	Bay Area AQMD	Bay Area
San Joaquin Valley	San Joaquin Valley Unified APCD	San Joaquin Valley
South Central Coast	San Luis Obispo County APCD	San Luis Obispo County
	Santa Barbara County APCD	Santa Barbara County
	Ventura County APCD	Ventura County
South Coast	South Coast AQMD	South Coast

1.3 PM2.5 Monitoring Requirements

According to the U.S. EPA PM2.5 regulation, all Metropolitan Statistical Areas (MSAs) with population greater than 200,000 are required to have core PM2.5 monitoring sites (core sites). Core sites are located where people live, work, and play which may not necessarily be at the expected maximum impact point for specific source emissions. By the regulation, core sites are the only sites eligible for comparison to both the annual and 24-hour PM2.5 NAAQS. They are the most important sites in the PM2.5 network. Core sites should have a population-oriented location and neighborhood or greater zone of representation. This means that PM2.5 concentrations within an area whose diameter is between 0.5 and 4 km (with the monitor in the center) should vary by no more than ±10 percent. The required number of core monitors and sampling frequency are determined by the population statistics for each MSA based on the 1990 census. The greater the population of an MSA, the more monitoring sites required in that area. Table 1.3.1 shows the minimum number of core monitors for a given MSA population.

Table 1.3.1 Number of Required Core PM2.5 Sites per MSA

MSA Population	Number of Core PM2.5 monitoring sites per MSA
200,000 to 500,000	1
500,000 to 1 million	2
1 million to 2 million	3
2 million to 4 million	4
4 million to 6 million	6
6 million to 8 million	8
> 8 million	10

One additional core monitor is required in every Photochemical Assessment Monitoring Station (PAMS) area. This monitor should be located at a PAMS site. The PAMS areas in California are Bakersfield, Fresno, Sacramento, San Diego, South Coast, and Ventura.

The regulations also require a PM2.5 monitor for every 200,000 people living either outside of an MSA or in MSA with fewer than 200,000 people. The total population in California for the base year 1990 was 29,758,213. There were 1,732,597 people living outside of MSAs or in an MSA with fewer than 200,000 people. Supplemental PM2.5 monitors are required in some of these less populated areas. Each of this additional monitors are to collect a 24-hour PM2.5 sample once every three days. Therefore, at a minimum, eight additional sites are needed to satisfy this requirement for supplemental PM2.5 monitoring. It is planned that more sites will be deployed than the minimum number required in an effort to provide better overall coverage.

The U.S. EPA determined the number of required core PM2.5 monitoring sites assuming that each of the core site categories below needs to be represented by a separate monitoring site:

- A population-oriented site with the highest expected PM2.5 concentrations.
- A site in an area of high population density with poor air quality (maximum population impact).
- A site collocated at a PAMS site, for each PAMS area included in the MPA.

The ARB and the local air quality agencies determined that in some areas of California the optimal monitoring coverage can be accomplished with fewer monitors than required by the U.S. EPA PM2.5 regulations. The following regulatory exemptions apply to these areas:

- One or more required core sites may be exempted in an area where the highest concentrations are expected to occur in an area of maximum population impact (one site may satisfy both the maximum concentration and the maximum population impact siting criteria).
- One or more required core sites may be exempted in an area with low concentrations (e.g., highest concentrations are less than 80 percent of the NAAQS).

Table 1.3.2 summarizes the PM2.5 monitoring sites required in MSAs and in PAMS areas in California. Refer to the particulate matter monitoring network description for each individual MPA in the appendices for a more detailed discussion of the proposed sites.

Table 1.3.2 Required and Proposed Core PM2.5 Monitoring Sites

MSA/PMSA	Population in 1990	Required PM2.5 Monitoring Sites			Proposed PM2.5 Sites
		Everyday Sampling	1 in 3 day Sampling	Total	
Los Angeles-Long Beach, CA PMSA	8,863,164	2-3*	8	10-11*	9
Riverside-San Bernardino, CA PMSA	2,588,793	2-3*	2	4-5*	10
San Diego, CA MSA	2,498,016	3	2	5	5
Orange County, CA PMSA	2,410,556	2	2	4	2
Oakland, CA PMSA	2,082,914	2	2	4	3
San Francisco, CA PMSA	1,603,678	2	1	3	2
San Jose, CA PMSA	1,497,577	2	1	3	2
Sacramento, CA PMSA	1,340,010	3	1	4	4
Fresno, CA MSA	755, 580	3	0	3	3
Ventura, CA PMSA	669,016	3	0	3	4
Bakersfield, CA PMSA	543,477	3	0	3	5
Stockton-Lodi, CA MSA	480,628	0	1	1	1
Vallejo-Fairfield-Napa, CA PMSA	451,186	0	1	1	1
Santa Rosa, CA PMSA	388,222	0	1	1	1
Modesto, CA MSA	370,522	0	1	1	1
Santa Barbara-Santa Maria-Lompoc, CA MSA	369,608	0	1	1	2
Salinas, CA MSA	355,660	0	1	1	1
Visalia-Tulare-Porterville, CA MSA	311,921	0	1	1	1
Santa Cruz-Watsonville, CA PMSA	229,734	0	1	1	1
San Luis Obispo-Atascadero-Paso Robles, CA MSA	217,162	0	1	1	2
Subtotal	**28,025,616**	**28**	**28**	**56**	**60**
Chico-Paradise, CA MSA	182,120	0	8	8	37
Merced, CA MSA	178,403				
Redding, CA MSA	147,036				
Yolo, CA PMSA	141,092				
Yuba City, CA MSA	122,643				
Outside of MSAs	961,303				
Subtotal	**1,732,597**	**0**	**8**	**8**	**37**
Total	**29,758,213**	**28**	**36**	**64**	**97**

* The number of monitors would depend on the location of the core monitor required in the South Coast PAMS area. This monitor may be located in the Los Angeles-Long Beach, CA PMSA or in the Riverside-

San Bernardino, CA PMSA.

2.0 EXISTING PARTICULATE MATTER MONITORING NETWORK

California has almost 10 years of PM2.5 data from dichotomous samplers at about 20 sites. In comparison, there are approximately 160 PM10 sites currently in operation. The existing dichot data have assisted in the design of the PM2.5 network by providing information on the trends and the magnitude of PM2.5 concentrations. By reviewing dichot data, it is apparent that PM2.5 concentrations are generally highest in the late fall and early winter throughout much of California. It is also known that nitrates are a much bigger component of PM2.5 than sulfates. There is a great deal of variation in particulate matter concentrations from region to region and within regions in the State as well.

The existing particulate matter network in California is comprised of 177 monitoring sites. The number of currently operating PM10 monitoring sites will not be reduced as a result of the new PM2.5 standards. California has State PM10 standards more health-protective than the PM10 NAAQS. Most areas of California have PM10 concentrations above the State PM10 standards and need to continue monitoring. Other areas with concentrations below the PM10 standards must maintain a minimum number of sites needed to determine long-term trends.

There are currently about 160 Size Selective Inlet (SSIs) samplers measuring PM10 levels throughout the State. In addition, there are about 20 dichotomous samplers collecting PM2.5 data and PM10 data. The dichotomous samplers are not considered an equivalent monitoring method to the new PM2.5 Federal Reference Monitor (FRM). Thus, the dichot data cannot be used for designating areas as attainment or nonattainment of the PM2.5 NAAQS.

The current particulate matter monitoring network in California consists of the following instruments:

- 160 High Volume SSI samplers collecting 24-hour average PM10 concentrations.
- 20 dichotomous sampler collecting 24-hour average fine fraction ($\leq$2.5 microns in diameter) and coarse fraction (>2.5 and $\leq$ 10 microns in diameter) samples.
- 30 continuous mass samplers collecting PM10 measurements hourly, using either a Tapered Element Oscillating Microbalance (TEOM) sampler or Beta Attenuation Monitor (BAM) sampler.
- 39 coefficient of haze instruments.
- 17 nephelometers.

The particulate matter data currently being collected are used for the following purposes:

- Compare the measured concentrations to the State and National PM10 standards.
- Track changes in the particulate matter concentrations over time.
- Evaluate the population exposure.
- Assess impact of transported particulate matter.
- Assist in health studies and other research.
- Manage the agricultural burning program.

The complete summary of particulate matter monitoring resources in California can be found in Attachment 1.

3.0 PM2.5 MONITORING NETWORK ELEMENTS

The newly planned PM2.5 monitoring network will collect data for multiple objectives, including:

- PM2.5 attainment/nonattainment designations.
- Development and tracking of implementation plans.
- Assistance in health studies and other research activities.

In order to understand the nature of the PM2.5 problem in California and develop control strategies, multiple types of PM2.5 monitoring instruments will be needed. The Federal Reference Method (FRM) sampler is a gravimetric filter-based sampler that produces a 24-hour average concentration of PM2.5. This is the only sampler currently approved that can provide data for determining attainment status of the area. Nevertheless, the FRM alone cannot support the multiple information needs of the PM2.5 network. The sampler has a Teflon filter that can experience loss of volatile constituents. The volatile components of PM2.5 can be more completely captured using a *speciation* sampler. The FRM also does not provide temporally resolved data or full chemical characterization of ambient aerosols.

The speciation sampler will provide chemical characterization of ambient aerosols for developing emission mitigation strategies and for tracking the success of implemented control programs. Continuous PM2.5 monitors will collect data for public reporting of short-term concentrations, for understanding diurnal and episodic behavior of fine particles, and for use by health scientists investigating exposure patterns.

3.1 Siting PM2.5 Monitors

The site selection process in California had many iterations and many opportunities for input. The process was coordinated by the ARB and involved air quality agencies from within California, U.S. EPA Region 9, and other stakeholders. Many competing needs and interests had to be considered when selecting sites for PM2.5 monitoring. Not all of the needs could be satisfied with the 1998 site allocation of 78 sites. The following is the list of network design objectives that were given the highest priority during the PM2.5 network design:

- Satisfy the EPA core monitoring requirements.
- Represent California air basins and provide geographical representation.
- Represent high concentrations in populated areas.
- Characterize emission sources in high concentration areas.
- Consider the needs of ongoing special health studies for particulate measurements.

The ARB and the local air quality districts analyzed all available information to develop a list of sites that would best satisfy these objectives. Preference was given to adapting existing sites to PM2.5 monitoring. During the site selection process, the ARB and the local air quality districts considered the following factors:

- Population statistics.
- Land use characteristics.
- Climate.
- Suspected area emission sources (le.g., wood smoke, agricultural burning, etc.).
- Existing monitoring network.
- Existing particulate matter data, including dichot data and PM10 data.
- Potential transport corridors.
- Ongoing special health studies.

The PM2.5 monitoring network planned for California will consist of the following sites:

- Ninety core PM2.5 monitoring sites. All core sites will collect data to determine attainment status with regard to the new PM2.5 standards. In addition, many of these sites will satisfy other monitoring objectives, including transport assessment and assistance in health studies.
- Two background sites to measure the lowest ambient PM2.5 concentrations representative of California.
- Five transport assessment sites to assess the impact of transported PM2.5 on ambient concentrations in the receptor area.
- Thirteen IMPROVE sites to assess visibility impairment.

Table 3.1.1 summarizes monitoring sites planned in California along with the monitoring equipment proposed at these sites. Attachment 2 lists all the monitoring sites and the type of instruments planned at these sites.

Table 3.1.1 Summary of PM2.5 Monitoring Sites

Site Type	Number of Sites	Monitoring Instruments		Monitoring Objective	Deployment Year
		Type	Number*		
Core	90	FRM	90	Determine attainment status for the annual and 24-hour standard, assess transport, support health studies	78 sites in 1998 12 sites in 1999
		Speciation sampler	37	Analyze source attribution, evaluate emission inventories and air quality models, support health related research studies.	1999
		Continuous sampler	8	Public reporting of short-term concentrations, understanding diurnal and episodic behavior of fine particles, investigating exposure patterns.	1999
Background	2	FRM	2	Measure lowest ambient PM2.5 concentrations	1999
Transport	5	Continuous PM2.5	5	Assess transport	1999
		Met suite	5		1999
IMPROVE	13	IMPROVE	13	Assess visibility impairment	1998 and 1999

* The number of instruments includes only primary samplers. The collocated samplers needed for Quality Assurance and Quality Control evaluation are not included in this table.

3.2 Core PM2.5 Monitoring Sites

The proposed PM2.5 monitoring network includes 90 PM2.5 monitoring sites to collect data for comparison to NAAQS standards. These sites are situated to meet the requirements for core PM2.5 monitoring sites (core sites). Based on the U.S. EPA regulation, core sites should include:

- A population-oriented site with the highest expected PM2.5 concentrations.
- A site in an area of high population density with poor air quality (not necessarily located in an area of expected maximum concentrations).
- A site collocated at a PAMS site, for each PAMS area included in the MPA.

The core sites are the most important sites in the PM2.5 network. Each core site will operate FRM samplers purchased through the National PM2.5 Procurement Contract established

by the U.S. EPA. Only data from core sites are eligible for comparison to both the annual and 24-hour PM2.5 NAAQS. All of the sites proposed for 1998 have a population-oriented location and neighborhood zone of representation. The *neighborhood zone of representation* means that the 24-hour concentrations should vary by no more than ±10 percent over an area whose diameter is between 0.5 and 4 km.

All core sites selected to operate PM2.5 FRM samplers are located in populated areas with expected high PM2.5 concentrations. Some core sites will provide useful information about PM2.5 transport and emission sources. Each of the California Air Basins will have at least one PM2.5 monitoring site. Air basins with high population and expected high PM2.5 concentrations will have additional monitoring sites to provide better geographical representation.

A list of all core sites proposed in California is included in Attachment 2. Attachment 3 lists site parameters at each site that will be established in 1998. The 14 sites planned for deployment in 1999 are not included in Attachment 3. Their selection is more tentative and contingent upon availability of grant funds from the U.S. EPA.

3.3 Transport and Background Monitoring

An individual monitoring site can have multiple types of monitoring instruments. Many of the proposed monitoring sites in California will collect data for multiple monitoring objectives. Some core sites will collect data that could be used for assessing transport of PM2.5 between different areas within and outside of the State, as well as for other monitoring objectives. These 24-hour average data collected using FRM will be of limited value for transport assessment. The FRM data will indicate the magnitude of PM2.5 concentrations at a site located in a transport corridor. To actually track the plume of transported PM2.5, hourly data are needed along with meteorological data. Deploying multiple instruments to provide this is expensive. Before significant resources are dedicated to transport assessment, the ARB and the local air quality agencies are proposing to do a pilot study in five transport corridors. This study would be designed to answer the following questions:

- To what extent does the transported PM2.5 contribute to high concentrations at downwind areas?
- How effective are the transport assessment tools?

Initially, we propose to evaluate the five corridors listed in Table 3.3.1 below. These are the most likely locations at which potential PM2.5 transport between air basins is expected to occur. This is a tentative proposal and will be further evaluated next year, after we collect more PM2.5 data. At the transport sites, we are considering deploying continuous monitors and surface meteorological instruments (wind speed, wind direction, temperature, relative humidity, and solar radiation). The most appropriate type of continuous particulate matter monitor for transport assessment will be determined at a future time. The ARB and the local air quality agencies are asking the U.S. EPA for additional grant funds to cover costs of purchasing continuous samplers and meteorological equipment, and for maintenance and operation for five

transport assessment sites in 1999.

If we find that transport of PM2.5 contributes to high concentrations at the receptor areas and that available tools are effective in the assessments, we would consider monitoring at other corridors in the future.

Table 3.3.1 PM2.5 Transport Corridors Selected for the Initial Evaluation

Source Area	Transport Corridor	Receptor Area
San Francisco Bay Area	Altamont Pass (Tracy)	San Joaquin Valley
San Joaquin Valley	Tehachapi Pass	Mojave Desert
South Coast	Soledad Pass	Mojave Desert
South Coast	Gajon Pass	Mojave Desert
South Coast	Banning Pass	Salton Sea

In addition to these special transport assessment corridors, a number of the core sites operating an FRM include transport assessment as one of the monitoring objectives. The PM2.5 data from these sites will be of little use in assessing transport unless meteorological data are collected at the sites as well. All of these core sites, except the monitoring sites in Redding and Ridgecrest currently collect meteorological data. In 1999, the ARB and the local air quality district propose to add surface meteorological monitoring instruments at the PM2.5 sites in Redding and Ridgecrest.

Background sites are intended to quantify regionally representative PM2.5 concentrations for sites located away from populated areas and other significant emission sources. Background sites should measure PM2.5 typical of the lowest ambient concentrations in California. Because of the size and geographical diversity of the State the current proposal is to have two background sites. The feasibility of locating PM2.5 background monitors at Point Reyes National Park and at Santa Rosa Island is currently being evaluated. Both of these sites would measure PM2.5 background concentrations using FRM monitors or continuous PM monitors.

3.4 PM2.5 Chemical Speciation Sampling

The basic objective of the chemical speciation sampling is to develop seasonal and annual chemical characterization of ambient aerosols across the nation. These chemically resolved data will be used to perform source attribution analyses, evaluate emission inventories and air quality models, and support health-related research studies.

The U.S. EPA is expected to support a network of 37 PM2.5 speciation sites in California with Federal funds. At least six of these sites are required by the regulation. One PM2.5 speciation sampler is required for each PAMS area. This sampler is required to be located at a

PAMS Type 2 site in each PAMS area. In most of California, the ozone season runs from late spring through the early fall when PM concentrations are lowest. The PAMS Type 2 sites were selected to capture the maximum ozone precursor concentrations during summer conditions. In most of California, the PM2.5 sites are most appropriately selected based on the fall and winter conditions associated with the high PM2.5 concentrations. Because PAMS Type 2 sites and PM2.5 sites have a population-oriented location, in some areas they coincide. However, not all of the PAMS areas will have the speciation sampler at a Type 2 PAMS site.

Overall, the U.S. EPA recognizes that sampling for speciation is a developing science. At the remaining 32 sites, the collection method can be tailored to the needs of individual areas. The ARB and the local air quality districts will select the speciation sampler best-suited for each of the monitoring sites in California. The selected instrument should collect samples for the currently targeted analytes, including the following:

- Cations: particulate ammonium, ionic sodium, calcium, and magnesium.
- Anions: particulate sulfate, nitrate, and chloride.
- Carbon: total, organic, and elemental.
- Trace elements: sodium, magnesium, etc., through lead.
- Semi-volatile organic particles.

Core PM2.5 sites that best meet the following criteria, listed in order of importance, were selected for collecting speciated data:

- High PM2.5 concentrations, or expected significant contribution of PM2.5 to high PM10 concentrations.
- Located in a area of significant population density.
- Supports the agricultural burning program in the Valley.
- Located in PAMS areas where there is a maximum precursor site for PM2.5 (this may also be a high concentration site).
- Significant for atmospheric transport determinations.
- Geographical representation of a monitored area.

The proposed sites are listed in Attachment 2.

3.5 Continuous PM2.5 Monitoring

The 40 CFR 58, Appendix D, 2.8.2.3 regulation requires that continuous samplers be placed in metropolitan areas with population greater than 1 million. Continuous PM2.5 data will provide useful data for public reporting of short-term concentrations, for understanding diurnal and episodic behavior of fine particles, and for use by health scientists investigating exposure patterns. The site selected to operate a continuous monitor will be determined during the annual network review and included in the 1999 monitoring network plan. The monitor will be installed

in late 1999.

Table 3.5.1 Continuous PM2.5 Monitors Required in California

MSA/PMSA by Monitoring Planning Area	Population in 1990	Required Number of Continuous Monitors
Bay Area MPA		
Oakland, CA PMSA	2,082,914	1
San Francisco, CA PMSA	1,603,678	1
San Jose, CA PMSA	1,497,577	1
Sacramento Valley MPA		
Sacramento, CA PMSA	1,340,010	1
San Diego MPA		
San Diego, CA MSA	2,498,016	1
South Coast MPA		
Los Angeles-Long Beach, CA PMSA	8,863,164	1
Riverside-San Bernardino, CA PMSA	2,588,793	1
Orange County, CA PMSA	2,410,556	1

3.6 PM2.5 Monitoring in Class I Areas

The U.S. EPA plans to locate an additional 13 IMPROVE monitors in California in the Class I Areas (national parks and wilderness areas) listed below. These IMPROVE sites will be used for visibility assessment. They will also be considered part of the PM2.5 network, although the data from the samplers for these sites will not be comparable to the standards for regulatory purposes. The IMPROVE Network is operated by federal land managers. Figure ____ shows a map of Class I areas in California. Those Class 1 areas that will be considered part of the PM2.5 network are underlined. The U.S. EPA is proposing that the federal land managers operate these sites. Table 3.6.1 includes IMPROVE site locations that will be part of the PM2.5 network.

Table 3.6.1 PM2.5 Monitoring in Class I Areas

Aqua Tibia Wilderness
Joshua Tree National Monument
Lava Beds National Monument
Marble Mountain Wilderness
Minarets Wilderness
Mokelumne Wilderness
San Gabriel Wilderness
San Gorgonio Wilderness
South Warner Wilderness
Ventana Wilderness
San Rafael Wilderness
Yolla Bolly Middle Eel Wilderness
Yosemite National Park

3.7 PM2.5 Quality Assurance and Laboratory Analyses

The California Air Resources Board, in coordination with U.S. EPA Region IX, will be implementing new Quality Assurance (QA) procedures for the PM2.5 Air Monitoring Program. The new QA procedures will be developed and included in the ARB Air Monitoring Quality Assurance manuals. These PM2.5 QA procedures will incorporate the requirements, as found in 40 CFR Part 58, Appendix A, and in *EPA Requirements For Quality Assurance Project Plans For Environmental Data Operations* (EPA QA/R-5), and the guidance, as found in the U.S. EPA Quality Assurance Handbook, Volume II. The ARB will include Quality Assurance/Quality Control (QA/QC) procedures specific for the PM2.5 Air Monitoring Program equipment which will be used to implement the program. The schedule for implementation will be as follows:

Submittal of the ARB PM2.5 Quality Assurance Project Plan (QAPP) outline	7/01/98
Submittal of the draft ARB PM2.5 QAPP	9/01/98
Submittal of the final draft ARB PM2.5 QAPP	11/12/98
Approval by U.S. EPA Region IX of the ARB PM2.5 QAPP	12/01/98
Implementation of the QA/QC activities as defined in the ARB PM2.5 QAPP	01/01/99

The QA/QC activities to be implemented will include, but not be limited to the following: participation in the National FRM Performance Audit Program, routine performance and system audits, data quality assessments, precision and accuracy reporting, site surveys, and a laboratory pre-certification review. The PM2.5 QAPP developed by the ARB will be utilized statewide as an integral part of the PM2.5 Air Monitoring Program.

The U.S. EPA is supporting the development of five following laboratories in California to perform filter weighing for mass determination:

- Bay Area AQMD.
- California Air Resources Board.
- San Diego County APCD.
- South Coast AQMD.
- Ventura County APCD.

The laboratories listed above are being upgraded to include the appropriate environmental controls and micro-balance. Because of the capital investment required to set up a proper filter weighing facility, each lab facility is expected to provide support not only within its district but also for surrounding districts. The Table 3.7.1 includes proposed division of responsibility.

Table 3.7.1 PM2.5 Mass Analysis Laboratories and Proposed Area of Responsibilities

Laboratory	Area of Responsibility by MPA	Number of Sites in 1998	Contact	Telephone Number
Bay Area AQMD	Bay Area Lake County North Coast	12	Rudy Zerrudo	(415) 749-4629
San Diego County APCD	San Diego Imperial Mojave	12	Mahmood Hossain	(619) 694-3358
South Coast AQMD	South Coast Coachella	17	Rudy Eden	(909) 396-2000
Ventura County APCD	Ventura Santa Barbara San Luis Obispo Portion of San Joaquin Valley	13	Doug Tubbs	(805) 662-6950
Air Resources Board	Sacramento Mountain Counties Northeast Plateau Lake Tahoe Great Basin Portion of San Joaquin Valley	24	Charles Cowell	(916) 323-0223

Samples collected from the speciation monitors will be analyzed through a nationwide network of one to three central contract laboratories. The contract laboratories are yet to be determined.

4.0 SAMPLING FREQUENCY

The federal requirements call for everyday sampling for PM2.5 at certain core SLAMS and one-in-three-day sampling at all other PM2.5 sites. All PM10 sites are required to sample on a one-in-three-day schedule, unless certain waivers apply. In order to collect sufficient data and at the same time conserve monitoring resources, we are proposing alternative sampling frequencies for PM2.5 and PM10.

4.1 PM2.5 FRM Sampling Frequency

Everyday sampling is required at 28 core PM2.5 sites in California (two sites per area over 500,000 population and one site per PAMS area). All other sites are required to sample once every three days.

The ARB and the local air quality districts propose a sampling frequency that will adequately support area designations, modeling, health studies, and other monitoring objectives during the first year covered by the plan (July 1, 1998 through June 30, 1999). The following waivers were considered bases for proposing less frequent sampling:

- A waiver from the everyday sampling schedule requirement for 1 year from the time a PM2.5 sequential sampler has been approved by the EPA.

- Exemptions from everyday or 1-in-3-day sampling during seasons or periods of low PM2.5. (A minimum frequency of 1-in-6-day sampling will be required.)

- Alternatives to everyday sampling schedules at sites with correlated acceptable continuous analyzers.

- Exemptions from 1-in-3-day sampling where existing information suggests that the maximum 24-hour-average measurements are less than the level of the standard.

The discussion of the proposed sampling frequencies is included in the MPA plans and summarized in Attachment 4. Some sites required to sample everyday will sample once every three days until the end of March, 1999, based on the 1-year waiver. After March 31, 1999 there will be 13 monitoring sites in California sampling everyday for PM2.5. An additional seven sites will sample everyday during the period of expected high PM2.5 concentrations (October 1 through March 31). The remaining sites will sample on a 1-in-3-day or 1-in-6-day schedule, depending on the type of sampling equipment and estimated PM2.5 concentrations. Some sites with PM2.5 concentrations estimated to be below the standard will sample on a 1-in-6-day schedule.

We will reevaluate the sampling schedule during the annual network review next year. Monitoring sites with PM2.5 concentrations above the 24-hour standard will be considered for more frequent sampling during the high PM2.5 season, which for most of the State is during the

fall and winter.

4.2 PM2.5 Chemical Speciation Sampling Frequency

The required sampling frequency for PM2.5 chemical speciation is one in 12 days. This sampling frequency may not be sufficient in some cases to adequately support control plans. The appropriate sampling frequency will be determined in the future and it will depend on data needs and available resources.

4.3 PM10 Sampling Frequency

The new U.S. EPA minimum requirement for PM10 sampling frequency is once every three days. The Air Resources Board and the local air pollution control districts in California are requesting that the U.S. EPA Region 9 grant a statewide waiver allowing sampling at the current schedule of one in six days, with certain exceptions to be determined on a case-by-case basis. To demonstrate changes in the attainment status for the national 24-hour PM10 standard, more frequent sampling may be needed. Monitoring sites with maximum 24-hour concentrations close to the 24-hour standard may be required to sample everyday or at least on a one in three day schedule. However, this should be decided on a case by case basis by the districts, the State, and the Regional EPA Office.